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A.D. 1824 . . . . . N<sup>o</sup> 4914.

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S P E C I F I C A T I O N

OF

MAURICE DE JONGH.

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APPLICATION OF COKE OVENS TO BOILERS  
FOR THE GENERATION OF STEAM, &c.

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L O N D O N :

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**Application of Coke Ovens to Boilers for the  
Generation of Steam, &c.**

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**DE JONGH'S SPECIFICATION.**

**TO ALL TO WHOM THESE PRESENTS SHALL COME, I, MAURICE DE JONGH, of Warrington, in the County of Lancaster, Cotton Spinner, send greeting.**

**WHEREAS** His most Excellent Majesty King George the Fourth, did, by  
5 His Letters Patent under the Great Seal of the United Kingdom of Great Britain, bearing date at Westminster, the Twenty-eighth day of February, in the fifth year of His reign, give and grant unto me, the said Maurice De Jongh, my exors, admors, and assigns, His especial licence, full power, sole privilege and authority, that I, the said Maurice De Jongh, my exors, admors, and  
10 assigns, should and lawfully might, during the term of years therein mentioned, make, use, exercise, and vend, within England, Wales, and the Town of Berwick upon Tweed, my Invention or discovery of "**CONSTRUCTING AND PLACING A COKE OVEN UNDER OR CONTIGUOUS TO STEAM OR OTHER BOILERS, SO AS TO MAKE THE HEAT ARISING FROM MAKING COKE, OR OTHER INTENSE COMBUSTION**  
15 **IN THE SAID OVEN, SUBSERVIENT TO THE USE OF THE BOILER, INSTEAD OF FUEL USED IN THE COMMON WAY, AND TO EXCLUDE SUCH HEAT FROM THE BOILER, WHEN REQUIRED, WITHOUT DETRIMENT TO THE OPERATION OF THE OVEN ;**" in which said Letters Patent there is contained a proviso that if I, the said Maurice De Jongh, should not particularly describe and ascertain the nature of my said Invention,  
20 and in what manner the same is to be performed, by an instrument in writing under my hand and seal, and cause the same to be inrolled in His Majesty's



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High Court of Chancery within four calendar months next and immediately after the date of the said Letters Patent, then the said Letters Patent, and all liberties and advantages whatsoever thereby granted, should utterly cease, determine, and become void, as in and by the said Letters Patent, relation being thereunto had, may more fully and at large appear. 5

**NOW KNOW YE**, that in compliance with the said proviso, I, the said Maurice De Jongh, do hereby declare that the nature of my said Invention, and the manner of performing the same, are particularly described and ascertained by the following Specification, and the Plates hereunto annexed, that is to say : — 10

For a boiler of about fourteen feet long and six feet wide from seating to seating, I build a circular wall (leaving an opening or doorway of about three feet two inches wide) round a space measuring about eight feet in diameter, see Figure 1, Plate I., hereunto annexed, which wall is to rise about one foot six inches perpendicular above the floor inside the circle, which floor is made 15 of common bricks set edgeways, and about five inches higher at the back than at the front of the oven, forming a regular inclined plane, to facilitate the discharging of the coke and make the coal burn more regular, as the depth of the coal should be less at the back than near the door, the bricks of the wall pointing lengthways to the centre ; upon this wall an arch or crown is raised, which 20 would rise two feet six inches more if it completely closed the oven in, and which would thus measure four feet high in the centre inside ; but the crown is not to be quite closed at the top, but leave a circular opening in the centre of about two feet diameter, which opening I denominate a crater ; about six inches below that crater, in the crown, is also an opening of about twenty-five square inches, left 25 for a flue to run to and communicate with the chimney, and is best on that side which is nearest the chimney. The doorway or oven mouth is lengthened forward about two feet three inches at the bottom, and the sides thereof are built up perpendicular, about two feet, and then covered in with an arch, about two feet six inches high in the centre from the ground, and intersected with the 30 crown of the oven : the said oven is inclosed by four sides of common bricks or stone, about eighteen to twenty inches thick and about twenty feet long, see Figure 1, Plate I., hereunto annexed. The oven itself, doorway, and flue to the chimney, must be of good fire bricks or other suitable materials, shaped for the purpose, firmly put together with fire clay, all of which is understood by 35 people who are in the habit of building ovens. The spaces between the outward wall and the oven must be firmly filled up and made solid with hard rubbish or such other materials as can best be procured, to the end of strengthening the building and excluding the outward air from the inside of the oven as



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much as possible. The ground in front of the oven should be lowered about eighteen inches for about seven or eight feet wide, and ought to be at least ten feet long, as is shewn by dotted lines at the said Figure 1. This is for the purpose of throwing coals into and drawing the coke out of the oven; the  
5 ground should also fall or decline a little from the oven, so that when the coke is slacked with water when drawn out of the oven, the water may run off to the further extremity, where a cistern or pit will be very useful and convenient. If the whole structure be raised about eighteen inches above the ground, then it becomes of course unnecessary to lower the ground. In the front wall, and  
10 about one foot three inches higher than the floor of the oven, and a few inches from the doorway, I fix strong iron crank'd rests, as represented by Figure II. in Plate I. hereunto annexed, about four inches long and three inches broad, and projecting about one inch and a half from the wall inside, for the purpose of carrying an iron cross bar or rest for the rake when coke is drawn out of the  
15 oven. In the front wall is fixed an iron door frame, as represented by Figure III., Plate I., hereto annexed. To the top part of the said door frame at A is fixed a chain for raising and lowering the said door, which said chain comes down and turns round B pulley, and goes up again and is hooked to a pulley C of about two feet diameter. Another pulley D of a larger diameter (that which I use is two  
20 feet six inches) is fixed on the same shaft. Outside the frame another chain E is hooked to the last-mentioned pulley, which goes over a windlass F, to which is fixed a rack, pulley, and catch. I shall not more minutely describe this frame, as it is well known and worked at the Duke of Bridgwater's Coke Ovens at Worsley, and in several other parts of Lancashire, and most likely also in other places, but I  
25 shall proceed to describe my construction of the lining or doubling of the inside of the iron door with fire bricks, tiles, or other suitable materials, which guards against accidental cracks and apertures in the door, (so common in doors lined in the usual way,) and consequently preserves better the heat, and is as follows, namely:—There is to be a ledge all round, about three inches broad inside, as is  
30 represented by Figure IV. in the Plate I. hereunto annexed, which shews the inside of the door with the ledge I allude to (which ledge is marked X). I lay the door in a flat horizontal position, the inside upwards, and divide it into eight compartments or parts, as dotted in the said Figure IV. The parts 1, 4, 3, and 6, are to be alike in size (about one foot or fourteen inches square I conceive best). In  
35 the centre of these four parts are round holes, made for half-inch or five-eighth bolts to go through. I then place on the parts 2 and 5 two fire bricks or tiles, three inches thick (which thickness I think most suitable) to fit those two parts exactly. These two bricks or tiles are to be bevel'd in a particular way; and to make this be best understood, let Figure V. in the Plate I. here-



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unto annexed represent one of these bricks or tiles, all the sides at right angles, and let *a*, *b*, *c*, and *d*, be destined for the sides of the compartments 5 and 2, lettered in the same way. Then I first bevel the two sides *b* and *d* both alike, and so as to make the brick or tile narrower at the top side from *b* to *d* than the bottom side; I then bevel the side *c*, and so as to make the bottom shorter 5 than the top. I call the bottom that part which lies next to the said door. I then place on the compartments 4 and 3 two bricks or tiles, also three inches thick, bevel'd both alike at the sides *c* and *d*. Figure VI. in the Plate I. hereunto annexed represents one of these bricks or tiles; the smallest part thereof marked A, which is represented uppermost, is to lie next to the said door, the 10 sides *a*, *b*, *c*, and *d*, are to correspond with the sides of the last-mentioned compartments, lettered in the same way. Two more such bricks or tiles, but bevelled at *b* and *c* sides, as represented in Figure VII. in the Plate thereunto annexed, are in like manner to fill the compartments 1 and 6; I mean that the four last-mentioned bricks or tiles are not to be placed on the said door in 15 the same way as they are represented by the Drawing to lie, but reversed or turned round, so that the parts which appear to be uppermost be next to the said door. It will from the last description easily be perceived that the four bricks or tiles of the corners 1, 4, 3, and 6, in the said Figure IV., lock down the two bricks on the parts 2 and 5, the bevels closing upon each other, and 20 leaving at the same time bevelled slides in space 7 on both sides, which space is to be filled with bricks bevelled at two slides to fit and slide down one after the other till the said space is filled, leaving the air hole D (Figure IV.) cut out. These last-mentioned bricks may be large or small. I found bricks about four inches broad to be the best and easiest to slide down; the length of the sliding 25 bricks is of course determined by the breadth of the said space, and all the bevels must be shaped to the same angle in order to fit close together. Through the before-mentioned four bolt holes in the said door I insert from the inside of the door four bolts, which also go through the four bricks or tiles, in which holes are to be made to correspond, and these bolts are to be lettered outside 30 the door, as is seen in Figure III., Plate 1, hereunto annexed, and to guard the bolt heads from injury by the fire, they are to be countersunk in the bricks about one inch; the cavities between the bolt heads and the level of the bricks or tiles are then carefully filled up with fire clay, so as to leave the bolt heads completely buried in the bricks or tiles; a little fire clay is also put between the 35 bevels of the bricks to bind them more firmly together. It will thus be seen that the said four bolts lock and keep all the bricks firm to the inside of the door. The space 8 in Figure IV. in the annexed Plate 1 may then be filled with a few fire bricks of the same thickness, or all in one, in the usual



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way, and will be kept from falling out by the brick wall or side against which the door moves up and down. As the opening of the oven does not reach so high as the door by several inches, the said brick or bricks in space 8 will thus always remain confined between the solid brickwork and the iron door. These  
5 last-mentioned bricks might also be locked down by bevels with the other bricks immediately under them, but I did not find it necessary. Over the air hole D (which hole I make three inches diameter) I place a round iron plate to turn on a bolt or pin put through the door from behind, before the brickwork or lining is put in, the head being countersunk on the other  
10 side of the pin; in front I put a nut, which will more or less keep the plate tight in the place it is turned to; the air hole can thereby be more or less opened to regulate the draft and the making of coke. *c* in Figure III. on Plate I. hereto annexed, shews the air hole; *a*, the pin or nut thereon; *b*, a little knob to turn the said iron plate by. The building is proceeded with thus;  
15 namely, the outward walls are to be raised to about the outward height of the oven; the space betwixt these walls and the oven is to be filled up as before mentioned, through that space; and at its proper height is also built the flue from the inside of the oven to the chimney. Then the outward top of the oven, as also of the solid part between the oven and the back wall or chimney,  
20 is formed by making it as level as possible from front to back; three feet on each side of the centre of the crater is to be the seating, whereon the boiler is to be placed; close to these seatings, within and parallel with them, I leave gutters or watercourses a few inches deep and wide, inclining forward, and communicating with the outside by means of small iron pipes; through the  
25 front wall behind the crater I cause the top part of the oven and of the solid part to slope a little from the middle on each side to the watercourses, for the purpose of draining off any water that may leak out of the boiler, and thereby keep the oven dry; these said watercourses are represented by *F, F*, Figure 9; Plate II., hereunto annexed. The said pipes must be kept plugged up when  
30 the oven is at work, so as to prevent the admission of cold air to the bottom of the boiler. Round the crater, the top is kept level in all directions, which is necessary for the cover of the crater, which I shall presently describe. I then place on the said top of the oven, and within two inches from the crater, two iron plates of about four feet six inches long, six inches broad, and  
35 one inch thick, with a feather or rib thereon half an inch high and one inch broad or thick, and which rib is to be about one inch and three-eighths of an inch from the outside, and three inches and five eighths of an inch from the inside of the said plate (I call the inside where the crater is, and the outside that nearest the waterways). Figure VIII., Plate II., hereunto



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annexed, represents an end view of one of these plates. *a* is the nearest the crater; *b*, the rib; and *c*, nearest the waterways. The ribs are to be about nine inches longer than the plates on the back side of the crater, for the purpose of being bricked or bound in a low cross wall of one or two courses of bricks across the oven, as by E, Figure 9, Plate II., is represented, which 5 said wall will keep these plates steady in their places; the heat will not so well permit of iron fastenings on that side the crater. In front of the crater I bind the plates with bolts and nuts or cotters, or any other way, to an iron cross bar, crank'd down on both sides into the waterways, or otherwise fastened to the brickwork; these two plates are thus steadily fixed on the top of the oven, as 10 level as they can be got parallel to each other, at a distance of four inches more than the diameter of the crater from each other inside, and so placed as to extend one foot three inches beyond the centre of the crater towards the back (besides the length of ribs), and three feet six inches towards the front from the centre of the crater. Figure IX. represents part of the top of the 15 oven; A, the crater; B, B, the two iron plates before described; C, the cross bar to which these plates are fastened; D, D, the two lengthened ribs; E, the little cross wall wherein these ribs are confined; F, F, are the gutters or waterways. I then place a cover on the plates B, B, in the following manner, I mean a cover which may be slid over the crater or drawn away from it as 20 occasion may require:—Two iron plates form the two sides of a frame, wherein a brick or stone cover is laid; these frame plates or frame side have two flat sides at right angles, as represented by Figure X. A stands upright, while B is horizontal; and these said plates are to slide with the part B upon that part of the plates marked G in Figure IX. and *d* in Figure VIII.; the 25 thickness of these frame plates I make five eighths of an inch, but they may be more or less; one of these frame plates (which are to be both alike) is represented by Figure XI. in Plate II. hereto annexed; the whole plate is about two feet six inches long and of two different heights, namely, from A to B, six inches long and three inches and a half high; from B to C, one foot long 30 and two inches and a quarter high; and from C to D, also one foot long and three inches and a half high, all outside measure, which may also vary, altho' I found these dimensions most proper; a hole is made in the said frame plate within about one inch and a half of that end of it which is intended to be nearest the front of the oven marked E, for the purpose of attaching to it a 35 strong iron bar seven feet six inches long, about three inches broad, and two inches and a half thick, see Figure XII.; at one end of the said bar I drill a hole through the broadest side, to correspond with the said hole in the frame plate; about two feet nine inches distant from the centre of that hole are to



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be rack teeth all the way to the other end of the bar, which bar I shall now call the rack; one end of a short flat iron plate about half an inch thick and about two inches broad is bolted fast to the said frame side by two bolts and cotters, which bolts are put thro' two other holes at F, F, Figure XII., in  
5 Plate II., hereto annexed; at the other end of the said plate is to be a hole similar to that in the rack and to the one made in the frame side. The rack is to be placed next to the frame side and the iron plate outside in such a way that the three holes meet, through which holes I put a pin three quarters of an inch diameter, the head inside either countersunk in the iron frame side  
10 or a space for it must be cut in the bricks of the cover, which bricks or stone will herein-after be mentioned, and I put a cotter through the pin on the other side; the said holes are of course to be suitable to that pin, and the hole through the rack is to be large enough to allow the said rack to move or turn easily up and down; the said plate is to be so bent that one end of it be near  
15 the frame side, and the other at such distance from it as to admit the rack to be placed between the said frame side and plate; Figure XII. in Plate II. hereunto annexed represents a top view of the said frame side, rack, and bent plate pinned together. There is further on that frame side four hollow sockets or steps for the purpose of receiving the forked parts of two flat iron bars,  
20 which are so bent as to go over and nearly to touch the stone or brick cover (which cover will be presently mentioned), and to bind both frame plates or sides, and to keep them parallel to each other. Figure XIII., Plate II., hereunto annexed, represents one of these flat iron bars with forked ends bent down; a rack is to be fastened to other frame side in the same manner. I put  
25 these frame plates in their places on the fixed plates, namely, one on each side of the crater, having about three-eighths of an inch play between the upright sides of the frame and the ribs on the fixed plates G, G. I then put two fire bricks to act as a cover over the crater (herein-before alluded to) between the two frame plates or sides that will stand the action of the fire and made for the  
30 purpose (and which I found best of Stourbridge potsheard's clay), so that each brick rests in the inside on the horizontal part of the frame plate; the two bricks are to lie close to each other, and to be about six inches and a half thick, sufficiently broad to reach from one frame plate to the other, and the two together to be about two feet six inches long; they may be thicker or  
35 thinner, or may be all in one brick or stone, but I have found it best as described, because if thinner they will not be strong enough, and if thicker it will cause the distance betwixt the bottom of the boiler and the top of the oven to be more than is desirable. I also prefer two bricks to one, because if one breaks it is more easily and with less trouble and expence replaced than if in



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one, which is also much heavier. Then after these bricks are placed in their places, the two before-mentioned flat bars, Figure XIII., are put over the bricks; the forked parts are to fall in the sockets appropriated for them, and will thus keep the cover firmly together. When thus the cover is properly put in its place ready to slide over the crater towards the front of the oven, and so 5 back again to cover the crater by means of the said racks, as will hereafter be described, I then place the boiler on the oven in such direction that the centre of the crater be perpendicular under that part of the boiler, which will be about two feet or two feet six inches from the front of the boiler, and at equal distances from the sides of it, and as near to the top of the oven as but just to 10 leave room for the top of the before-mentioned cover of the crater, with the cross irons over it, to be clear of the bottom of the boiler. A flue is to be carried round the boiler, as shewn by dotted lines, Figure XV., Plate II. The before-mentioned surrounding walls are to be carried up to the height which the said flues require. The space betwixt the bottom at the back end of the boiler and 15 the top of the solid part at the back of the oven is to be firmly closed in with fire-bricks from both sides, leaving an opening in the middle of about one foot wide, as represented by Figure XIV. in Plate II. hereunto annexed; one brick length will be sufficient for the thickness of this inclosure, and which must be linable with the back end of the boiler, the whole length of the brick 20 being put under the boiler, so that one end of the brick be in a perpendicular line with the said back end of the boiler. Slides must be built of bricks against the said inclosure, to allow of a brick or stone damper, of about three inches thick and about two feet wide and sufficiently high, to slide in and to cover the said opening of one foot. There must be sufficient play left in the slide for the damper 25 to move easily and freely up and down. This damper is suspended by strong iron rods or bars uniting from two points of the said brick damper to a chain or upright bar for some distance, which is continued up by chain through the brickwork, which closes in the flue and turns over a pulley with a counter weight, but the whole of it so arranged as to save the iron from the action of the heat, which will 30 issue with great force from under the boiler through the hole of the inclosure, as will be seen by the Drawing in said Figure XIV. The damper is there represented by lines when up, and by dots when down. The reason of leaving the damper so much wider than the hole, it is to remove the iron work from the hole. A groove must be left on the top of the solid part at the back of the oven, 35 immediately under the damper, for the damper to descend into, because the damper is to go down when the inclosure is to be opened, and up when to be shut; the reason of this is to keep the heat close to the boiler bottom; and here it is necessary to remark that the flue which communicates from the oven



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to the chimney, as before described, must not come in the direction of the cavity or groove under the damper, but must be carried in another direction, as the cavity would otherwise come into the flue. Other sorts of dampers and contrivances to open and close that hole may be made to have the same effect, 5 but I recommend the one described as most efficacious. The object sought for and to be obtained by an opening in that particular place is to govern the heat under the boiler, and which heat is further regulated by the dampers in the chimney, which will presently be described. When this damper is shut the space under the boiler will be confined all round; the heat which will issue 10 from the oven through the crater can thus, by means of that damper, be kept more or less under the boiler as occasion may require; when the inclosure damper is open the heat will travel from A, Figure XV., inclosure opening, to C, the entrance into the chimney. In the chimney must be very closely and well built, by upright walls or other partitions, the flue which communicates 15 with the flue round the boiler, and another flue which communicates with that of the oven, as is represented by B, C, Figure XV., Plate II., hereunto annexed. About eighty square inches each would suffice if no larger flues can be obtained, and at a distance of about three feet above the top brickwork of the boiler marked A, Figure XIV., in Plate II., hereunto annexed. These 20 flues in the chimney should end with iron dampers particularly well and closely fitted, so that the drafts may be governed by the said dampers. The before-mentioned racks being pinned to the frame plates of the cover with the pins, as before described, are to project through the front wall; it is well to have a small iron frame, the thickness of the wall, fixed in the wall where the racks 25 run through, and no larger than just to admit the racks to pass easily; this opening must, however, be stopp'd up or luted with clay or other matter, to keep the cold air out when the crater cover is stationary. Under these racks outside of the oven, and at the distance of about fourteen inches from the front wall, more or less, I place a round iron shaft, sufficiently strong to 30 turn in steps or bearings, and I let either the shaft itself touch the bottom of the rack or put the shaft a few inches lower, and stake bowls or pulleys on the said shaft immediately under the racks, and upon which the said racks are to run; these bowls ought to be somewhat broader than the racks, and the said shaft will of course turn round as the racks move in or out. I place the bearings 35 or pedestals on pillars put firmly down in the ground for the purpose, and with bars fixed or bound in or to the front wall or rests. Projecting from the said wall or in any other convenient way, another cross shaft, sufficiently strong, but somewhat longer than the one before described, with crank'd handles at each end, is placed over the racks and parallel to the one just described and per- 40 pendicularly over it, also in steps or bearings on which are staked rack pinions



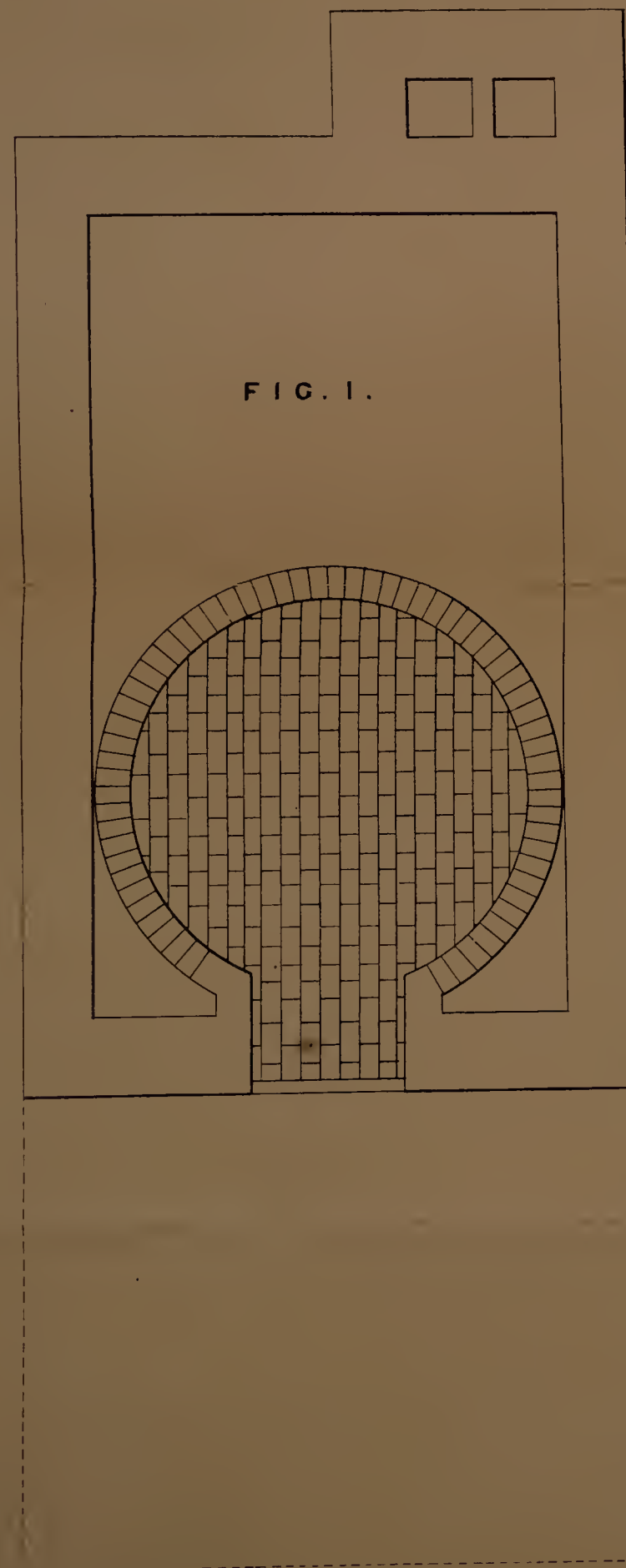
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of about six inches diameter (but which may be of greater or smaller diameter as more or less power may be required), so as to gear and work the rack backwards and forwards, whereby the crater cover before described is moved or slid over or from the crater. These last-mentioned steps marked A, Figure XVI., Plate II., hereunto annexed, will be immediately over those 5 in which the shaft under the rack turns, marked B, and may be placed or fastened on a bridged iron plate C, of sufficient strength and breadth, fastened in the front wall D at one end, and which plate is then bent over the pedestal or bearing B, and is fastened at the other end E to the plate F, which binds the before-mentioned pillar to the said front wall. Washers or 10 plates are put on both sides the wall, against which the said plates are cottered, or they may have shoulders outside or in front, and be cottered at the back or behind the wall in their proper places. It may be proper here to remark that instead of iron other suitable metal may be used for the before-mentioned purposes. I shall here describe how I work my coke oven. About 15 two tons to two and a quarter of coal is a proper charge for the before-described oven, which, when put into the oven after the proper heat shall have been obtained (and which is understood by people in the habits of making coke) will kindle into a blazing fire. If steam be wanted, then the cover of the crater must be drawn forwards so as to leave the crater open and the damper 20 that governs the flue of the oven shut, and the boiler flue damper just sufficiently open to clear gradually what smoke there may appear to hover about in the oven, but which will scarcely appear coming out of the chimney, as it will be mostly consumed before it reaches the damper; the enclosure damper is also to be sufficiently lowered to admit of a passage and circulation in the 25 boiler flues; sufficient atmospheric air should also be admitted thro' the hole in the oven door to promote combustion; the bitumen of the coal will thus burn, and the great heat and blaze it produces will abundantly generate steam in the boiler. But when it is desired to cease raising steam, then the boiler flue damper must be shut and the oven flue damper opened; the crater cover is 30 also put over the crater. In about twenty-four hours the blaze will considerably decrease, and in proportion as it decreases communication with the outward air ought more and more to be cut off by means of shutting the damper and door hole; more and more steam will still be generated if the oven flue be shut and boiler flue and crater kept part open; the enclosure opening ought 35 in that stage of the process to be kept only about two inches open, when the blaze much lessens. The second day of the charging an increase of heat in the oven will be required to burn the coke down to the bottom; this is obtained by closing the crater more and more, as the reverberation from the bricks greatly increases the heat. In about forty hours after charging, the 40



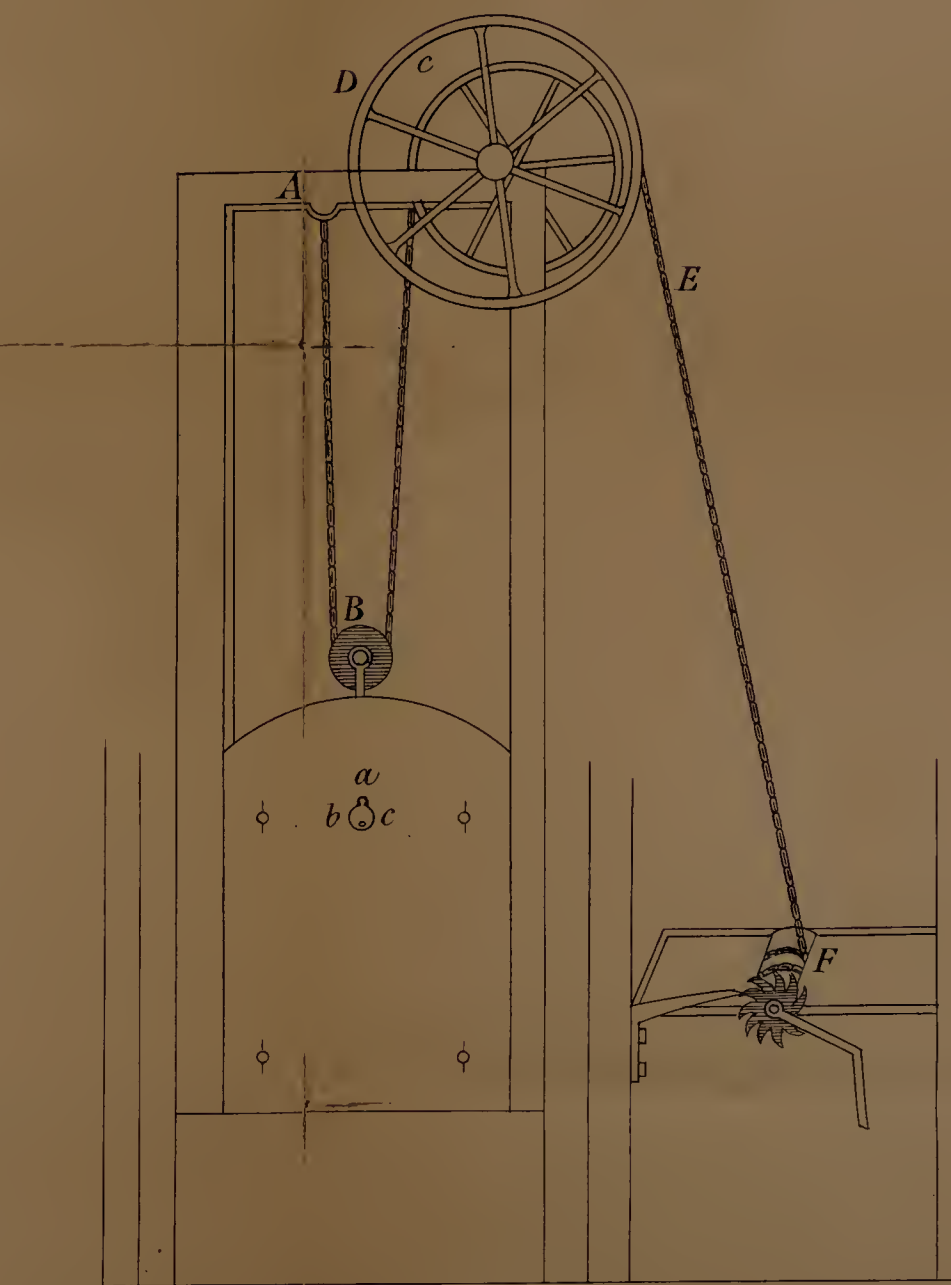


1 2 3 4 5 6 7 8 9 10 feet

FIG. 2.



FIG. 3.



0 1 2 3 4 5 feet.

FIG. 4.



FIG. 5.

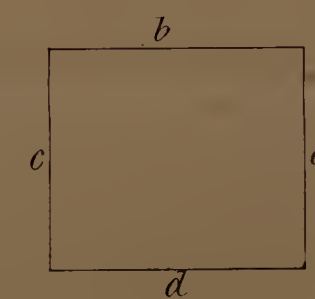


FIG. 6.

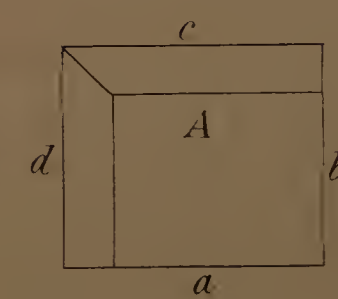
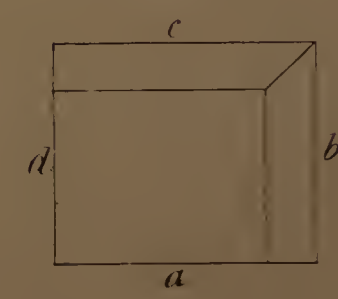


FIG. 7.



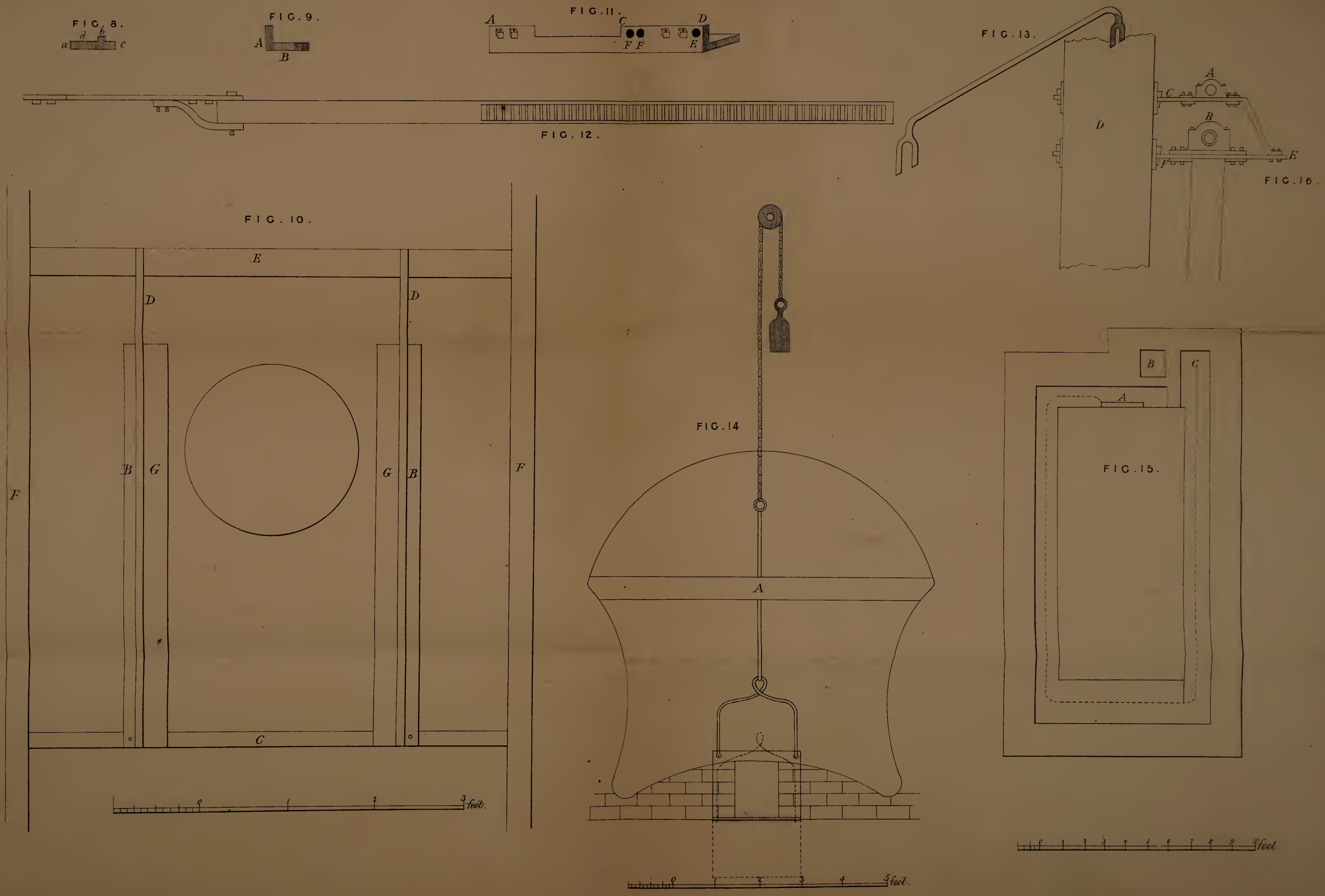
0 1 2 3 feet.

The enrolled drawing is partly colored.









The enrolled drawing is partly colored.







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blaze will be very inconsiderable, and then all the dampers and front hole ought to be nearly closed, and in a few hours more the coke is ready to be drawn and a fresh charge may be put in the oven. Experience will soon shew any workman accustomed to fires in which way the dampers and crater cover  
 5 will be best used for the different purposes of creating steam in the boiler, preventing the same, and increasing the heat in the oven, as also the making of coke. The opening of the two front boiler flue doors, which doors are generally put to boiler flues, will accelerate the lowering of steam if required, but the crater should then be shut and the oven flue opened. When regular  
 10 and constant steam is required, I recommend to have two or more such ovens and boilers at work, and to charge the ovens at different days, in order that when the steam of one boiler is not sufficiently strong, it being the day after charging, that boiler the oven of which was charged on that day will be in full action. And, lastly, I declare that I do not claim as my Invention anything  
 15 herein-before described except the so constructing and placing the coke oven under the boiler as to answer the ends of making the heat arising from making coke or other intense combustion subservient to the use of the boiler, and to exclude such heat from the boiler when required, without detriment to the operation of the oven; and this is effected by the before-described crater cover,  
 20 and the manner in which it is made to work, as also by the inclosure under the back end of the boiler, with the damper thereof, and the way in which that damper is made to work, and also the way in which the door is lined, and the manner in which the oven is placed under the boiler.

In witness whereof, I, the said Maurice De Jongh, have hereunto set my  
 25 hand and seal, the Fifteenth day of June, in the year of our Lord One thousand eight hundred and twenty-four.

M. DE JONGH. (L.S.)

**AND BE IT REMEMBERED**, that on the Fifteenth day of June, in the year of our Lord 1824, the aforesaid Maurice De Jongh came before our said  
 30 Lord the King in His Chancery, and acknowledged the Specification aforesaid, and all and everything therein contained and specified, in form above written. And also the Specification aforesaid was stamped according to the tenor of the Statute made for that purpose.

Inrolled the Eighteenth day of June, in the year of our Lord One  
 35 thousand eight hundred and twenty-four.

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